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10/718,751	11/21/2003	Ayumu Ikemoto	MM4643	1834

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EXAMINER

BRUENJES, CHRISTOPHER P

ART UNIT PAPER NUMBER

1772

DATE MAILED: 06/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/718,751

Applicant(s)

IKEMOTO, AYUMU

Examiner

Christopher P. Bruenjes

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. The restriction requirement of record in the Office Action mailed March 24, 2006 has been withdrawn due to the Examiner's reconsideration of the restriction requirement. Therefore, all 7 pending claims were examined on the merits and the right to file a divisional application directed to claim 6 has been rescinded.

Claim Objections

2. Claims 3 and 4 are objected to because of the following informalities: The limitation "said intermediate rubber layer" should be changed to "said first rubber layer" to be consistent with the language presented in claim 1. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Enomoto et al (JP 2001-182872 A).

Enomoto et al anticipate a flexible hose (p.1, paragraph 1 of machine translation). The hose comprises a metal bellow tube (reference number 1, Figure 2 and p.1, paragraph 5 of machine translation). The tube has a first rubber layer (reference number 2, Figure 2) on the outer circumference thereof and an exterior layer (reference number 4, Figure 2) formed on the outer circumference of the first rubber layer (p.2, paragraphs 9 and 14 of machine translation). The metal bellow tube has a corrugated structure with a plurality of spaced apart rings having peaks and a plurality of channels disposed between the rings forming valleys below the peaks and wherein the first rubber layer is flowable at low temperature such that each channel is filled with rubber extending throughout the valley (Figure 2 and p.2, paragraph 12 of machine translation). The rubber composition includes ethylene propylene diene rubber and/or rubber of an acryl group such as ethylene-acrylic rubber (p.2, paragraph 11 of machine translation).

Claim Rejections - 35 USC § 103

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5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Enomoto et al as applied to claim 1 above in view of Poxon et al (USPN 3,420,553).

Regarding claim 2, Enomoto et al teach all that is claimed in claim 1 as presented above, but fail to teach that the plurality of channels disposed between the rings vary in width in a radial direction wherein the width of each channel between peaks is narrower than the width of each valley below the peaks.

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However, Poxon et al teach that the specific configuration taught in Applicant's claim 2 is well known in the art of forming polymeric covered metal bellows tubes as shown in Figure 3 of Poxon et al. One of ordinary skill in the art would have recognized that the exact shape and configuration of the individual corrugations of the metal bellows of Enomoto et al would be determined through routine experimentation to determine the best adhesive connection between the metal bellows and the first rubber layer and the desired end result of the hose.

Therefore, it would have been obvious to one having ordinary skill in the art that the corrugations of the metal bellows of Enomoto et al would be formed having width of each channel between peaks narrower than the width of each valley below the peaks since it is a configuration that is well known in the art as shown by Poxon et al, and since it would be obvious to one having ordinary skill in the art that if the channel between the peaks is narrower than the channel between the valleys it would be more difficult for the rubber to pull away from the metal bellows, which is the desire of Enomoto et al.

Regarding claim 3, Enomoto et al teach that a reinforcing layer (reference number 3, Figure 2 and p.2, paragraphs 13 and

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14) is formed between said intermediate rubber layer and said exterior layer.

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Enomoto et al in view of Poxon et al as applied to claim 2 above, and further in view of Ikeda et al (US 2002/0074050 A1).

Enomoto et al and Poxon et al taken as a whole teach all that is claimed in claim 2 as presented above, but fail to teach that the intermediate rubber layer further comprises a resorcinol group. However, Ikeda et al teach a hose formed of metal bellows (p.6, paragraph 80) with a rubber layer bonded to the metal layer (p.5, paragraph 79). Ikeda et al further teach that a resorcinol group is added to a rubber bonded to an inner metal tube because the resorcinol group acts as an adhesive to the metal and improves adhesion between the metal and rubber (p.1, paragraph 14). Therefore, it would have been obvious to one having ordinary skill in the art that a resorcinol group is added to a rubber layer that is bonded to a metal tube in order to improve the adhesion between the rubber and metal tube, as taught by Ikeda et al.

Thus, it would have been obvious to one having ordinary skill in the art at the time Applicant's invention was made that

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a resorcinol group would be added to the first rubber layer of Enomoto et al in order to improve the adhesion between the first rubber layer and the metal, as taught by Ikeda et al, since it is the desire of Enomoto et al to have a strong bond between the rubber and metal bellows.

9. Claims 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Enomoto et al in view of Poxon et al and Ikeda et al as applied to claim 4 above, and further in view of Kubota et al (WO 2001/57132 A1). Note US 6,689,843 is the English equivalent of WO 2001/57132 A1 and the column and line citing will be from the US patent.

Enomoto et al, Poxon et al, and Ikeda et al taken as a whole teach all that is claimed in claim 4 as presented above, but fail to teach that the first rubber layer comprising the acryl group is an acryl group of the formula claimed. The rubber composition claimed in claim 5 is an ethylene acrylic ester copolymer or ethylene acrylic rubber having a carboxyl group. Enomoto et al teach that the rubber composition of the first rubber layer is formed of ethylene acrylic rubber, but does not explicitly teach that the ethylene acrylic rubber further contains a carboxyl group or the percentage of ethylene, acrylic ester, and carboxyl groups present in the composition.

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However, Kubota et al teach that acrylic rubbers are widely used in the automobile field such as the hose of Enomoto et al because of its good heat resistance (col.1, 1.22-23). Kubota et al further teach that there is a demand for producing an acrylic rubber having more enhanced heat resistance (col.1, 1.24-26) and that adding a carboxyl group to the acrylic rubber increases the heat resistance (col.1, 1.65-67). Kubota et al just as Enomoto et al teach that the acrylic rubber is formed of ethylene and acrylic acid ester monomers (col.3, 1.34-50). Kubota et al also teach that the acrylic acid ester monomer combined with the carboxyl group is contained in the mixture in an amount of 70% or greater (col.3, 1.50-55), which correlates to the combined value of y and z in claims 5 and 7. Kubota et al also teach that of the combination of acrylic acid ester and carboxyl group, the acrylic acid ester forms 90% or greater of the mixture. Therefore, Kubota et al teach values for x representing the ethylene monomer, y representing the acrylic ester portion, and z representing the carboxyl group that fall within the ranges claimed in claims 5 and 7. Kubota et al teach that these values are determined because if the concentration of the ethylene monomer is too large the rubber becomes poor in rubber characteristics (col.3, 1.54-60) and if the concentration of the carboxylic group is too small the rubber is poor in

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crosslinkability and if it is too large the rubber has poor tensile strength and elongation (col.4, 1.1-9). One of ordinary skill in the art would have recognized that a carboxyl group is added to an ethylene acrylic acid ester co-polymer rubber in order to provide the rubber with enhanced crosslinkability and ultimately heat resistance, as taught by Kubota et al.

Thus, it would have been obvious to one having ordinary skill in the art at the time Applicant's invention was made to add a carboxyl group to the ethylene acrylic acid ester rubber of Enomoto et al in order to provide the rubber with enhanced heat resistance, which is an increasing demand in the automobile field, as taught by Kubota et al. Furthermore, it would have been obvious to one having ordinary skill in the art at the time Applicant's invention was made to set the relative amounts of the ethylene monomer, acrylic acid ester monomer, and carboxyl group would fall within the claimed range in order to form a rubber composition that has the desired amount of rubber characteristics crosslinkability and tensile strength and elongation, as taught by Kubota et al.

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Enomoto et al in view of Poxon et al and Ikeda

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et al as applied to claim 4 above, and further in view of Ozawa et al (USPN 6,492,454) and Watanabe et al (USPN 6,166,143).

Enomoto et al, Poxon et al, and Ikeda et al taken as a whole teach all that is claimed in claim 4 as presented above, but fail to teach that the first rubber layer comprising the acryl group is an acryl group of the formula claimed. The rubber composition claimed in claim 6 is an ethylene acrylic ester copolymer or ethylene acrylic rubber having an epoxy group. Enomoto et al teach that the rubber composition of the first rubber layer is formed of ethylene acrylic rubber, but does not explicitly teach that the ethylene acrylic rubber further contains an epoxy group or the percentage of ethylene, acrylic ester, and epoxy groups present in the composition. However, Ozawa et al teach that in production of hoses comprising metal and rubber layers ethylene acrylic rubber or ethylene acrylic acid ester copolymer rubber is known to have excellent heat resistance but does not bond well to metal (col.2, 1.40-53). Ozawa et al further teach that if ethylene acrylic acid ester is formed with an epoxy group such as ethylene-acrylic acid ester-glycidyl methacrylate copolymer rubber, the rubber does not require an additional polymer having epoxy groups to provide adhesiveness with a metal layer, because the epoxy group contained within the acrylic polymer provides

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the adhesiveness (col.11, 1.37-50). Therefore, it would have been obvious to one having ordinary skill in the art at the time Applicant's invention was made to select an ethylene acrylic rubber containing epoxy groups such as the ethylene-acrylic acid ester-glycidyl methacrylate copolymer rubber taught by Ozawa et al in order to provide the ethylene acrylic rubber with the ability to be adhered to metal, as taught by Ozawa et al.

Thus, it would have been obvious to one having ordinary skill in the art at the time Applicant's invention was made to form the first rubber layer formed of ethylene acrylic rubber of Enomoto et al with an epoxy group, in order to provide the ethylene acrylic rubber with adhesiveness to the metal layer in the hose of Enomoto et al, as taught by Ozawa et al.

Ozawa et al fail to teach the individual percentages of the ethylene monomer, acrylic acid ester monomer, and epoxy group present in the first rubber layer. However, Ozawa et al does teach that the ethylene acrylic acid ester copolymer rubber has any compositional proportion within the range generally used so long as the ethylene content therein is within the range that does not impair rubber elasticity and satisfy the characteristic of heat resistance (col.9, 1.64 - col.10, 1.4). Watanabe et al teach that the compositional proportions of the ethylene and acrylic ester is between 50:50 and 85:15 in order to maintain

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rubber elasticity (col.4, 1.40-50). Watanabe et al also teach that the epoxy group is found in the copolymer rubber in an amount between 0.05 and 5mol%. Therefore, Watanabe et al teach values for x representing the ethylene monomer, y representing the acrylic ester portion, and z representing the epoxy group that fall within the ranges claimed. Therefore, it would have been obvious to one having ordinary skill in the art at the time Applicant's invention was made that the compositional proportions taught by Watanabe et al are within the range generally used because the proportions are used in order to maintain rubber elasticity of the rubber, as taught by Watanabe et al.

Thus, it would have been obvious to one having ordinary skill in the art at the time Applicant's invention was made to select the compositional proportions of the ethylene monomer, acrylic acid ester monomer and epoxy group of in the first rubber layer of Enomoto et al and Ozawa et al within the claimed ranges, since Ozawa et al teach that the compositional proportions fall within the range generally used in order to preserve the rubber elasticity of the composition and Watanabe et al teach specific values within the claimed ranges as the proportions required to ensure that the composition maintains its rubber elasticity.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hibino et al (US 2003/0066568 A1); Hines (USPN 4,147,185); Kanba et al (US 2004/0266922 A1); Moreiras et al (USPN 5,413,147).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher P. Bruenjes whose telephone number is 571-272-1489. The examiner can normally be reached on Monday thru Friday from 8:00am-4:30pm.

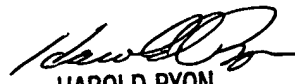
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Christopher P Bruenjes
Examiner
Art Unit 1772

CPB *CPB*
June 8, 2006


HAROLD PYON
SUPERVISORY PATENT EXAMINER
1772

6/9/06